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TOXICOLOGY RESEARCH DAY



WEDNESDAY, MAY 6, 1987

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COUNCIL ON ENVIRONMENTAL AND OCCUPATIONAL HEALTH AND SAFETY
DALHOUSIE UNIVERSITY
HALIFAX, NOVA SCOTIA



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COUNCIL ON ENVIRONMENTAL AND OCCUPATIONAL HEALTH AND SAFETY DALHOUSIE UNIVERSITY

The Council is an interdisciplinary forum for professionals from faculties, departments and institutes within the university, researching and teaching in the fields of environmental and occupational health and safety. The Council provides a mechanism for the exchange of information among units and disciplines for the co-ordination of appropriate activities, for the planning of joint projects and for updating inventories.

The Council will concern itself with laws, policies, epidemiology, community and public health, toxicology, transport and fate of materials, institutions and educational programs involved with physical, chemical, biological/micro biological hazards in the workplace, the community and ecosystems. As such the Council will enhance the university's ability to respond to a public need expressed in the recent passage of occupational health and safety legislation in Nova Scotia and in the concern expressed in the news media about such chemicals as PCB's, tetrachloroethylene and pesticides.

GOALS

The short-term goals of the Council are the compilation of an accurate inventory of expertise and research at Dalhousie; raising the profile of the university in the community, with industry and government on matters of environmental and occupational health through conferences or workshops; and to provide support to individual researchers and units in the preparation of grant and contract proposals.

The long-term goal is the development of strong interdisciplinary research and education activities in environmental and occupational health fields at Dalhousie. The Council could promote directions for interdisciplinary studies and continuing education such as emphasizing physical, chemical, and biological hazards in the primary resource industries such as farming, fishing and forestry. Activities might include training programs for people in the Maritimes, and Canadians generally, and from developing countries.

ORGANIZING COMMITTEE

R. F. McCurdy	Department of Pathology
B. Freedman	School for Resource and Environmental Studies/ Department of Biology
A. D. Fraser	Department of Pathology
P. K. Yeung	College of Pharmacy
K. W. Renton	Department of Pharmacology
R. P. Côté	School for Resource and Environmental Studies

MORNING SESSION

ROOMS 224-226
STUDENT UNION BUILDING

- 0900 Introduction of Dr. A. M. Sinclair
- 0905 Opening remarks and welcome - Dr. A. M. Sinclair,
Vice-President (Academic and Research)
- 0910 Comments by Chairman, Organizing Committee, R. F. McCurdy

ECOSYSTEM EFFECTS OF TOXIC GASES, ELEMENTS AND ACIDIFICATION

B. Freedman

Department of Biology and
School for Resource and Environmental Studies

The ecosystem-level effects of toxic gases, elements and acidification can be studied by examining the long-term changes that occur in the vicinity of natural sources of pollution, or by studying the usually shorter-term damages that are found in anthropogenically-contaminated landscapes. This presentation will describe environmental degradation caused by: 1) natural pollution at the Smoking Hill in the Northwest Territories, where the spontaneous combustion of carbonaceous shale has caused an intense fumigation of the tundra with SO₂, with subsequent development of a severe acidification of terrestrial and aquatic systems; 2) anthropogenic point-source emission of SO₂ and toxic metals from a large smelter at Sudbury, Ontario; and 3) acidification of fresh water in Nova Scotia, although there is uncertainty concerning the relative roles of anthropogenic and natural contributions to this process.

DEPRESSION OF MURINE HEPATIC MIXED FUNCTION OXIDASE DURING INFECTION WITH LISTERIA MONOCYTOGENES

Shana Azri and Kenneth W. Renton
Department of Pharmacology

The level of cytochrome P-450 and the oxidation of aminopyrine and benzo(a)pyrene hydroxylase was depressed in hepatic microsomes prepared from mice infected with the gram positive bacteria Listeria monocytogenes. Maximum depression of mixed function oxidase occurred on the second day of infection. This loss in drug biotransformation capacity in the liver was directly correlated with the number of organisms found in that organ. The ability of mice to metabolize drugs in vivo was also impaired during Listeria monocytogenes infection. During the infective period the half life of theophylline was significantly prolonged and the N-demethylation of aminopyrine as measured by the expiration of ¹⁴CO₂ from radiolabeled aminopyrine was diminished. The loss of drug metabolism was not due to interferon production, fever or morphological damage to the liver. These results indicate that certain bacterial infections can depress drug biotransformation and elimination in a similar manner to that already reported in viral and parasitic infections. This finding may be of significance to patients receiving drugs which are metabolized by the mixed function oxidase system during episodes of infection with some bacteria.

THE LEVEL OF MERCURY IN HAIR AND NAILS OF DENTAL PERSONNEL IN ATLANTIC CANADA

D. W. Jones, E. J. Sutow and R. A. Holden
Division of Biomaterials Science
Faculty of Dentistry

Mercury toxicity in humans was first observed by Theophrastus in the year 380 B.C. The occupational toxic effects amongst workers exposed to mercury has been well documented over the past 1000 years. Concern has been expressed that the occupational exposure of dental personnel to mercury may present a health hazard. A recognition of the potential health hazard of mercury exposure in dental offices has resulted in Canadian and American dental associations publishing recommendations on dental hygiene. The present paper will report on the level of mercury in the hair and nails in dental personnel in Atlantic Canada.

A STUDY OF CANCER INCIDENCE AND MORTALITY AMONG OFFICE WORKERS

Franklin White, Jennifer Dingle and Elva Heyge
Department of Community Health and Epidemiology

A concerned population of 2000 office workers was studied to determine whether observed cancer incidence and mortality exceeded expected values, and whether cancer occurrence and length of employment in a particular building were associated. Historical cohort studies and a case control study were conducted using records linkage techniques. Five sets of reference values were used for comparison: Canadian and Nova Scotia experience derived from the Mortality data base of Statistics Canada, mortality experience from a 10 percent sample of the Canadian labour force, incidence from the Nova Scotia cancer registry, and expenditures across broad diagnostic categories from the Provincial Medical Services Insurance Commission. No overall excess incidence or mortality was observed, and there was no suggestion of association with length of employment. The confirmed increase in incidence and mortality was attributed to an aging population.

ARSENIC: A DECADE OF PROGRESS

R. F. McCurdy and J. T. Hindmarsh
Department of Pathology and
Victoria General Hospital

Arsenic contamination of groundwater in Nova Scotia was first identified in February 1976, when a resident of Waverley was diagnosed as being a victim of arsenic intoxication. Subsequently, hundreds of homes have been identified as having groundwater supplies with arsenic concentration in excess of the Canadian Drinking Water Standard's maximum permissible limit of 0.05 mg/L.

Over the past decade, considerable research has been completed or is underway which helped to determine the limits of the arsenic problem. Some of those areas investigated that will be presented include: extent of the problem, type of well at risk, water treatment, proportion of the different forms of arsenic, extent of toxicity to those exposed, hair arsenic type of exposure and body burden and threshold of neurotoxicity.

RADIOIMMUNOASSAY FOR 7-HYDROXCHLORPROMAZINE: MONOCLONAL VS POLYCLONAL ANTIBODIES AND COMPARISON WITH HPLC

P. K. Yeung¹, J. W. Hubbard², T. Gurnessey² and K. K. Midha²

¹College of Pharmacy, Dalhousie University, and

²College of Pharmacy, University of Saskatchewan

7-Hydroxchlorpromazine (7-OHCPZ) is an important metabolite of the widely used anti-psychotic drug chlorpromazine (CPZ). It has been reported that schizophrenic patients responding well to CPZ had higher plasma concentrations of 7-OHCPZ than poorly responding patients, and that 7-OHCPZ was as effective as CPZ in the treatment of chronic schizophrenia when it was administered directly to patients. Analysis of the amphoteric 7-OHCPZ by physico-chemical methods has been a difficult task mainly because of the extremely low plasma concentrations of this metabolite in clinical samples. Radioimmunoassay (RIA) could be an attractive alternative to physico-chemical methods. In order to develop RIA for 7-OHCPZ, mouse monoclonal antibodies and rabbit polyclonal antibodies were raised against a 7-OHCPZ antigen which was prepared by covalently linking the 10-dimethylaminopropyl side chain of 7-OHCPZ to bovine serum albumin. The monoclonal antibodies were found to be considerably more specific than the polyclonal antibodies. A highly sensitive and specific RIA was developed using the monoclonal antibodies. The RIA compared reasonably well with a high performance liquid chromatography (HPLC) assay when they were used independently to determine plasma 7-OHCPZ concentrations in health volunteers after receiving a single oral dose of CPZ. (This work was supported by MRC of Canada PG-34.)

THE EFFECT OF PLASTICIZERS ON THE RAT KIDNEY

J. F. S. Crocker, P. D. Acott, A. T. J. McDonald

Department of Pediatrics and

Izaak Walton Killam Hospital for Children

Approximately 40% of long-term dialysis patients acquire polycystic kidney disease (PKD). They also have a higher incidence of malignancy. Studies have shown an increased body burden of phthalates in these patients and structurally related chemicals have been shown to induce PKD in lab animals. We investigated the effect on rat kidneys of long-term feeding of these plasticizers in animals with and without uremia. Rats with normal kidneys showed increased evidence of PKD with phthalates and decreased renal function. Morphologic and biochemical analyses are now being performed on the uremic animals.

ACCESS TO PESTICIDE REGISTRATION DATA IN CANADA: WHO SHOULD KNOW?

F. G. Cohen¹, F. M. White², R. F. McCurdy³ and R. P. Côté¹

¹School for Resource and Environmental Studies,

²Community Health and Epidemiology and

³Department of Pathology

The effective development of public health policy requires that decision-makers and their scientific advisers have access to vital information. This statement appears to be a truism but, in fact, is not, especially in the case of pesticide registration studies - the dossiers of toxicologic evaluations, including tests of teratology and reproductive toxicity, that manufacturers must submit to the Canadian government as part of the regulatory process. Key information in these dossiers is considered only by federal officials and is subsequently shielded, thus, preventing independent assessment by scientists, some provincial officials and the general public, all of whom may have access only with the permission of the manufacturer. Federal policy and pesticide manufacturers justify the secrecy on the grounds that the dossiers contain trade secrets and that a company's investment in developing a product must be protected. For public health officials and their scientific advisers in Canada, however, the secrecy of the studies represents a roadblock to effective decision-making.

DETERMINATION OF TOTAL AND BIOAVAILABLE SELENIUM IN FOOD

L. S. McDowell and A. Chatt

Trace Analysis Research Center

Department of Chemistry

Selenium is an important element in animal and human nutrition. The proximal and distal effects of selenium in animals have been well documented. Presently, the U.S. Food and Drug Administration recommend safe and adequate intake ranges of 50 - 200 ug Se per day for adults. For humans, the major source of selenium is via the diet.

The total selenium content of a two day hospital diet from the Victoria General Hospital was determined using Neutron Activation Analysis. The average intake was found to be within the estimated FDA range. An in vitro enzymolysis procedure simulating human digestion was used to estimate the bioavailability of selenium from three food items of the hospital diet. The release of soluble selenium from the food items was shown to be incomplete and varied according to food type.

AFTERNOON SESSION A

Room 324

Student Union Building

POLYCHLORINATED BIPHENYLS AND MIXED FUNCTION ENZYMES
IN GROUND SLEEPS

GUEST SPEAKER

K. W. Barton¹, R. P. Addelman², A. J. Edwards³ and P. P. Ward⁴¹Department of Pharmacology and

Physiology, and Ontario, Health Services Lab.

Medical Institute of Technology

THE STATE AND FUTURE OF TOXICOLOGY
IN CANADADr. H. B. Schiefer
DirectorToxicology Research Centre
University of Saskatchewan

EFFECTS OF PESTICIDES ON VEGETATION OF POST-GLACIAL PLAINS

R. B. Smith and G. J. Steward

Dr. Schiefer is currently Chairman, Associate Committee on Toxicology, National Research Council and is past President, Society of Toxicology in Canada

AFTERNOON SESSION A

Room 224
Student Union Building

POLYCHLORINATED BIOPHENYLS AND MIXED FUNCTION OXIDASE IN GREY SEALS HALICHOERUS GRYPUS

K. W. Renton¹, R. F. Addison², A. J. Edwards¹ and P. F. Brodie²

¹Department of Pharmacology and

²Fisheries and Oceans, Marine Ecology Lab
Bedford Institute of Oceanography

Recent studies from our laboratory have indicated that seal species indigenous to the North Atlantic accumulate polychlorinated biphenyls (PCB). We have also demonstrated that the activity of the mixed function oxidase in harbour seals and grey seals varies with age. Because seals of varying ages will have different exposure (dose and time) to these chemical pollutants we have studied the relationship between the activities and levels of different types of cytochrome P-450 in the liver and the type and concentration of PCB's to determine the effect of xenobiotics in the ocean environment. The blubber content of PCB was determined in 38 grey seals Halichoerus grypus aged from newborn to 34 years of age sampled on Sable Island, Nova Scotia. Total PCB concentration was highest in mature male animals with a mean of 73.3 ± 6.8 ppm. A large number of different PCBs could be detected. The PCB level in the blubber of mature female animals was approximately 30% of that found in the adult males animals. Young seals aged newborn to three weeks of age had PCB levels which were less than 10% of that found in the adult males. No sex differences were apparent in the PCB levels observed in these young animals. Total hepatic cytochrome P-450 levels increased with age and a different isozyme profile could be detected by SDS-polyacrylamide gel electrophoresis in individual seals. The activity of various isozymes were determined by measuring aminopyrine N-demethylase, benzo(a)pyrene hydroxylase, lauric acid hydroxylase and the oxidation of ethoxy-, pentoxy-, and benzyloxyphenoxazones. A correlation between the levels of the various PCBs and the levels and activities of the various isozymes of cytochrome P-450 will be made. Possible induction of cytochrome P-450 in the livers of a species high in the food chain may be a sensitive indicator of the extent of the effect of chemical pollutants in the ocean environment.

EFFECTS OF HERBICIDES ON VEGETATION OF FORESTRY CLEARCUTS

R. Morash and B. Freedman

Department of Biology

This study examined short-term changes in vegetation following an aerial application of glyphosate (N-phosphonomethyl glycine) for conifer release on two regenerating clearcuts in central Nova Scotia. Glyphosate was effective in suppressing competing vegetation, particularly for the first post-spray year. Subsequent ecosystem recovery was influenced by initial species composition, and the regeneration strategy of various plant species.

INHALATION OF COMBUSTION PRODUCTS FROM PLASTICS AND OTHER MATERIALS: DEVELOPMENT OF A MODEL

D. T. Janigan, H. K. Moores and R. Hajela
Department of Pathology

The findings of obliterative airway disease in a man surviving exposure to combustion products from polystyrene and particle wood board led to the development of a small apparatus for testing the sublethal effects of smoke inhalation in mice. Extensive experience has been gained with products from poly-urethane foam; preliminary with polystyrene and with particle board. Methods established for assessment of lung changes at intervals after exposure include morphologic ones and bronchoalveolar lavage. The latter is analyzed for total and differential leukocyte counts and cell cytochemistry for lysosomal and oxidative enzymes and, in the supernatant, for total protein, albumin and lysosomal enzyme measurement. This model would appear to be useful for general inhalation toxicology. The apparatus and some results will be presented.

FISH TOXICOLOGY - ENZYMATIC INDICES OF SUB-LETHAL STRESS

R. F. Addison
Department of Fisheries and Oceans and
School for Resource and Environmental Studies

Acute toxicity--death--is often used as a measure of the biological effects of chemicals under controlled conditions, as in the assessment of the possible impact of factory effluents, or the effects of a newly developed drug or other chemical. For obvious reasons, death is not a useful measurement of the effects of chemicals which may already be present in the environment, or which may be released in uncontrollable amounts. In such cases, we need some measure of the effects of a chemical long before death occurs; that is, an early warning of a sub-lethal effect on a test organism.

Environmental toxicologists have examined several biochemical indices during the last decade or so. One of the most promising appears to be induction of hepatic microsomal detoxification enzymes, whose activity increases rapidly when a test organism is exposed to sub-lethal concentrations of various chemicals. Examples will be given of the use of hepatic microsomal enzyme induction as an indicator of the effects, in the wild, of some industrial wastes, such as those from electrolytic, petroleum and pulp and paper industries. Some interesting comparative biochemical or pharmacological questions which have emerged from such studies will be discussed.

ECOTOXICOLOGICAL STUDIES WITH MARINE ZOOPLANKTON AND ORGANIC CONTAMINANTS - A SYNOPSIS

P. G. Wells

Environment Canada and
School for Resource and Environmental Studies

Marine crustacea, particularly copepods, brine shrimp and decapods, are actively used in many countries to investigate the acute and chronic toxicities of organic contaminants. This talk describes highlights of recent research with petroleum hydrocarbons, whole oils and spill control agents, with a particular emphasis on deriving QSAR (quantitative structure activity relationships) and understanding the environmental factors that influence the toxicities of spilled oils. The research presented is part of a long collaborative interdisciplinary study on the fate and effects of organics in Canadian waters. Future research in zooplankton toxicology (deriving new methods, improving present ones, correlating lab-field studies, and better utilizing zooplankters in marine chemical hazard assessment and monitoring schemes) is briefly discussed. The ecological importance, practicality, and sensitivity of zooplankters to various chemicals brings an urgency and many challenges to this area of ecotoxicology.

EFFECTS OF SILVICULTURAL HERBICIDE TREATMENTS OF REGENERATING CLEARCUTS ON THE BIRD COMMUNITY

D. Mackinnon

Department of Biology

A naturally regenerating forest clearcut is a vigorous and highly-productive ecosystem, with a complex vegetational structure, and a relatively rich and diverse breeding bird community. Herbicides are used by foresters to suppress rapidly-growing angiosperm vegetation, which might compete with economically-desirable conifers on clearcuts. At doses normally received during operational herbicide treatments, these herbicides have a small direct toxicity to wildlife. However, by killing susceptible vegetation, herbicides reduce the primary productivity and structural complexity of the wildlife habitat, and may in this way adversely affect bird species which are specific to these sites. At the same time, herbicides may create a habitat which is suitable for birds that require a relatively open and less productive site.

This presentation will describe this ecotoxicological problem, with particular reference to the silvicultural use of herbicides in Nova Scotia.

THE ROLE OF TOXICOLOGY AND HAZARD STUDIES IN ENVIRONMENTAL MANAGEMENT

R. P. Côté and D. L. Wallace

School for Resource and Environmental Studies
and Environment Canada

This paper argues that environmental protection and management in the 1990's must be based on the principles of prevention, prediction and risk assessment. Pollution control must now focus on the causes rather than the effects with an emphasis on prevention and environmental planning. This change in emphasis will also require more research in predictive techniques. Prediction cannot be improved, however, without a concomitant increase in hazard studies and monitoring efforts related more specifically to the predictions made. Finally, the concept of risk and the use of risk analysis and management must be incorporated into the application of the policy. The application of these principles should result in a more efficient and comprehensive approach to the management of toxic chemicals and their sources.

AFTERNOON SESSION B

**Room 226
Student Union Building**

BIOCOMPATIBILITY AND TOXICOLOGY STUDIES OF BIOMATERIALS

D. W. Jones¹, J. Lovas², C. W. Foong³, B. B. Harsanyi¹ and R. Howell²

¹Division of Dental Biomaterials Science

²Division of Oral Pathology and

³College of Pharmacy

Biomaterials are increasingly being used in medicine either as containers (blood), implants (prosthesis), drug carriers (insulin polymer implants) or a prosthodontic and restorative filling materials in dentistry. However, there is a gap in information pertinent to their biocompatibility and toxicology. Thus, there is a tremendous need for biocompatibility and toxicology studies of commercially and newly synthesized biomaterials. The Division of Dental Biomaterials Science has been designated as the compliance testing laboratory for Dental Canadian Standard testing. A research programme has also been initiated to evaluate or refine existing techniques recommended by ISO and CSA and to develop more specific methodologies. This paper presents an overview of our current research program. Several thousand different dental materials and devices are imported into or manufactured in Canada. It is important to ensure that materials and devices imported into or manufactured in Canada and used in the provision of dental health care meet a minimum standard and are safe to use.

CYTOTOXICITY TESTING OF ESTER PLASTICIZERS

J. Lovas¹, R. Howell¹, D. W. Jones² and C. W. Foong³

¹Division of Oral Pathology

²Division of Dental Biomaterials Science

³College of Pharmacy

Esters used as plasticizers in biomedical and dental soft polymer materials have been shown to leach out and may present a potential toxicity risk (Jones et al 1986). An agar overlay cytotoxicity test (L929 mouse fibroblasts) has been conducted on four commonly used esters. This paper will present an evaluation of the cytotoxicity of dibutyl phthalate, butyl phthalyl butylglycolate, and benzyl salicylate compared to the commonly used plasticizer in medical blood bags di(2 - ethylhexyl) phthalate and a control polymer containing dibutyltin.

GASOLINE SNIFFING AND LEAD POISONING

M. A. Moss¹ and P. J. Cooper²

¹Department of Pathology and

²Department of Neurology

The prevalence of gasoline sniffing (GS) has probably been underestimated; it is endemic in certain communities in the Canadian North. It has been most frequently reported amongst Indian and non-Indian rural adolescents from lower socioeconomic backgrounds. The neurological manifestations of GS are varied, and their aetiology may not be apparent unless the physician obtains a thorough history and makes the association.

In this paper, a 19 year old chronic gasoline sniffer is described who presented with myoglobinuria and subsequently with acute lead encephalopathy. This was attributed to his "recreational" use of gasoline. This case touches upon two medico-social issues of current interest, namely those of solvent abuse in general, and lead poisoning. The diagnosis and treatment of lead encephalopathy in this context is discussed, and the importance of drug rehabilitation programs stressed.

HEMOLYSIS TESTING OF SIX LEACHABLE PHTHALATE ESTERS

R. E. Howell¹, W. C. Foong² and D. Jones¹

¹Faculty of Dentistry and

²College of Pharmacy

Jones et al (1987) identified six leachable esters from eight commercially available polymers. However, the effect (if any) of these esters to biological systems is unclear. The present study evaluated the effect of these esters and DEHP (di-2-ethylhexyl phthalate) on biological membranes using the hemolysis test (ISO Technical Report 1984). Briefly, diluted heparinized rabbit blood were incubated with the ester (1 hour) and the degree of hemolysis measured spectrophotometrically. Preliminary results shows that these esters were not hemolytic at concentrations leached from the polymers into PBS. Pure esters, when incubated with rabbit blood resulted in an appreciable amount of hemolysis. While low amounts of esters leached may not result in hemolysis, the effects of prolonged low levels of exposure to these esters is still unclear. We are currently investigating the hemolytic effect of each ester at various concentrations when dissolved in various solvent systems.

NEPHROTOXIC EFFECTS OF URANIUM IN DRINKING WATER AN ANIMAL MODEL

D. C. Campbell, M. A. Moss, R. F. McCurdy and L. C. Dymond

Department of Pathology
Victoria General Hospital
and Camphill Hospital

Uranium (as uranyl nitrate dissolved in drinking water) was administered to male Sprague-Dawley rats at a dosage of 20 mg/Kg body weight/day, daily for 12 days following a five day acclimation period. Twenty-four hour urine specimens were analyzed for total protein, glucose, urea, creatinine, sodium and protein electrophoresis. Body weight, urine volume and tap water consumption was also monitored.

Changes in the urine analytes of the treated rats occurred as early as day 3, and moved furthest from the control rat analyte values between days 4 and 8. After day 8, a trend was observed whereby the analytes returned to levels similar to those of the control rats. During a two-day recovery period, the analytes of the treated rats remained similar to the control rat values.

URINARY SCREENING FOR ALPRAZOLAM, TRIAZOLAM AND THEIR METABOLITES WITH THE EMIT^R d.a.u.TM BENZODIAZEPINE METABOLITE ASSAY

A. D. Fraser and A. Isner

Toxicology Laboratory
Victoria General Hospital

Alprazolam (Xanax^R) and triazolam (Halcion^R) are relatively new triazolobenzodiazepines which are anxiolytic and hypnotic in man. The objective of this study was to assess the reactivity of these drugs and their major metabolites in the EMIT^R d.a.u.TM benzodiazepine metabolite assay. Analytical standards of drugs and metabolites and urine specimens from patients receiving these drugs were analyzed by EMIT. Alprazolam and a-OH alprazolam gave an equivalent response to the EMIT low calibrator between 0.2-0.3 ug/mL. The 3HMB benzophenone derivative of alprazolam and 4-OH alprazolam were only reactive at 10ug/mL in the EMIT assay. The assay was positive in 24/27 random urine specimens (alprazolam) and in 8/19 urine specimens (triazolam). Positive urine results were confirmed by analyzing for major urinary metabolites a-OH alprazolam and a-OH triazolam by HPLC. All alprazolam specimens were positive for a-OH alprazolam. Six of the eight triazolam specimens were confirmed by HPLC. In conclusion, the EMIT assay can reliably detect significant amounts of alprazolam/metabolites in the urine but was negative in 58% of the specimens from individuals receiving triazolam.

DEVELOPMENT OF A MUCOUS MEMBRANE IRRITATION TEST USING THE HAMSTER CHEEK POUCH

B. B. Harsanyi¹, W. C. Foong², D. W. Jones¹ and M. Mezei²

¹Faculty of Dentistry and

² College of Pharmacy

Current techniques for mucous membrane irritation testing in the hamster cheek pouch have a low success rate (Stanley 1985, Roy and Wishe, 1986). The aim of this study was to develop a better technique. Initially, 8 Golden Syrian Hamsters were divided into four groups of two. Polymer implants were placed in the blind ends of their pouches on one side only and the pouches closed by sutures. The experiments were performed sequentially and the technique modified based on ongoing results. Hamsters were examined daily, then weekly, killed and the pouches examined histologically. In the last group, one implant was retained for 28, the other for 35 days. Tissue reaction to the sutures could be distinguished clearly from the reaction to the implant. The successful technique was repeated on 8 hamsters (test material Fitt, 4mm dm, 2mm thick disk, miniature pouch with displaced ostium at bottom of original pouch). After 21 days, all sutures and implants were in situ, whereas Roy and Wishe (1986) report a retention rate of 0/10 to 8/10 per group after 14 days.

MERCURY POLLUTION IN THE DENTAL ENVIRONMENT

D. W. Jones and E. J. Sutow

Division of Dental Biomaterials Science

Faculty of Dentistry

Exposure to mercury by dental personnel in the dental office has been recognized as a possible health hazard for many years. The risk involved should neither be exaggerated nor neglected. Dental amalgam has been used as a restorative material or filling teeth for well over 150 years. Dental amalgams are alloys consisting of one or more metals combined with the liquid metal mercury. The amount of mercury vapour present in the dental operator will be influenced by the type of equipment and methods of mixing (trituration) used, as well as the type of floor coverings and general mercury hygiene employed.

As extensive evaluation of the mercury vapour in the air in dental offices has been conducted in Atlantic Canada by the Division of Dental Biomaterials Science at Dalhousie University. This paper will review the extent of this problem.

LEACHABILITY OF POTENTIALLY TOXIC PLASTICIZERS FROM DENTAL PROSTHODONTIC SOFT POLYMERS'

D. W. Jones¹, E. J. Sutow¹, W. M. Tobin¹, B. S. Graham² and G. C. Hall¹

¹Division of Dental Biomaterials Science, Dentistry

²Assistant Dean, Academic Affairs

The loss of effectiveness of soft polymers in prosthodontic dental treatment and management of traumatized oral mucosa and atrophic resorption of the alveolar bone may occur due to leaching of plasticizers. There has also been some speculation with respect to the potential toxicity of some ester plasticizers. The soft polymers are generally mixtures of methacrylate polymers with ethyl alcohol and a plasticizing agent to induce polymer chain entanglement and gel formation.

The present paper will report on quantitative and qualitative in vitro leachability of plasticizer constituents from 8 commercial dental soft polymer gel systems. The leachability of the esters is between 10 and 40 times the level for normal background obtained from food or the environment, however, it is still less than 1/2 the most stringent ADI value.

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